TRIENNIAL LACTATION BIOLOGY SYMPOSIUM/BOLFA: The biology of lactation– from genes to cells to milk¹

C. Farmer²

Agriculture and Agri-Food Canada, Sherbrooke Research and Development Centre, 2000 College St.,
Sherbrooke, QC J1M 0C8, Canada

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In 1992, the first workshop on Biology of Lactation in Farm Animals (**BOLFA**) was held in Madrid, Spain, jointly with the European Federation for Animal Science (**EAAP**). The goal of this new workshop was to create a forum where scientists with a similar interest in lactation biology in farm animals could gather and exchange recent research findings. The 2017 meeting held in Baltimore, MD, as a pre-conference to the Joint American Society of Animal Science (**ASAS**) and Canadian Society of Animal Science (**CSAS**) Annual Meeting, was the 14th BOLFA meeting and also marked the 25th anniversary of the first meeting. The symposium was entitled “The biology of lactation– from genes to cells to milk” and covered a wide range of topics from epigenetics to hormonal, environmental and nutritional factors involved in the control of mammary development and lactation in various animal species.

Dr. Steven Zinn from the University of Connecticut (Storrs, CT) started the symposium by discussing the origins of this workshop, who was involved in developing the original workshop in Madrid, and its location through the years. Dr. Robert J. Collier from the University of Arizona (Tucson, AZ) provided an overview of the evolution of research in lactation biology from the latter half of the 20th century until the present. He discussed the development and use of numerous techniques

that were instrumental in the discoveries made in this field (Collier and Bauman, 2017) and ended by listing the various centers of excellence involved in lactation research. The next speaker was Dr. R. Michael Akers (Virginia Polytechnic Institute and State University, Blacksburg, VA) who described some of the developmental changes induced by endocrine and nutritional manipulations taking place in the peripubertal bovine mammary gland. He discussed possible hypotheses as to the impact of those changes on future animal performance (Akers, 2017). Recent findings showing a link between the feeding level of heifer calves and expression of estrogen receptors in their mammary tissue were described (Geiger et al., 2016). Dr. Russell C. Hovey (University of California, Davis, CA) more specifically discussed allometric ductal growth in mammary tissue of various animal species, and how it can be influenced by diet composition and plane of nutrition (Berryhill et al., 2017). He demonstrated that excess rate of BW gain or obesity can be detrimental for mammary development during the peripubertal period. Dr. Hovey mentioned some endocrine changes that can contribute to this impairment of mammary growth. The stimulation of mammary ductal growth by types of dietary fats was also discussed.

Dr. Steven R. Davis (Livestock Improvement Corporation, Hamilton, New Zealand) focused on the lactation period. He discussed the relationship between the extent of mammary development taking place during pregnancy and lactation, and milk yield in a number of species (Davis, 2017). This included a survey of methods available to estimate mammary gland size (e.g., weight, volume or udder capacity) and of factors, such as hemi-mastectomy and litter size, that can stimulate mammary development and milk yield. The following speaker was Dr. Marie-France Palin from Agriculture and Agri-Food Canada

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²Corresponding author: chantal.farmer@agr.gc.ca

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Research and Development Centre, Sherbrooke, QC, Canada. She discussed the newly suggested role of adipokines for mammary growth and function as well as the role of milk adipokines for neonatal development (Palin et al., 2017). A thorough review of the literature was presented and indicated that adipokines could act as metabolic sensors to regulate mammary growth and function during late gestation and early lactation. Furthermore, adipokines were shown to be important regulators of the action of lactogenic hormones in the mammary gland. This talk was followed by that of Dr. Geoffrey E. Dahl from the University of Florida (Gainesville, FL; Dahl et al., 2017) on the negative impact of late gestation heat stress on subsequent cow milk yield and lactation performance of their offspring. The various physiological pathways responsible for this altered productivity were reviewed and possible epigenetic mechanisms of action were proposed.

The last 2 presentations focused on issues that affect the health and performance of lactating dairy cattle. Dr. Laura L. Hernandez (University of Wisconsin-Madison, Madison, WI) is a specialist on serotonin and she addressed the functions of this monoamine during lactation. An important action of serotonin is the maintenance of maternal calcium homeostasis, whereby the mammary gland could function as an accessory parathyroid gland during lactation. The unique feedback loop through which serotonin and calcium act during lactation to regulate milk calcium and maternal calcium homeostasis was discussed (Hernandez, 2017). The final presentation was made by Dr. Rupert M. Bruckmaier (University of Bern, Bern, Switzerland) who discussed new strategies to optimize the immune system of lactating dairy cows. This is most important considering the prevalence of infectious diseases such as mastitis. More specifically, the potential of manipulating the permeability of the blood-milk barrier as a treatment for mastitis was suggested as feasible as long as specific antibodies against pathogens can be efficiently transported to infected glands (Bruckmaier and Wellnitz, 2017).

In summary, the wide variation of topics presented at the 2017 BOLFA symposium allowed coverage of both historical and broader perspectives of research in lactation biology in farm animals over the years, and also provided updates on current novel areas of re-

search. This symposium created a unique opportunity for scientists focusing on lactation biology in a variety of farm animal species to exchange and compare information. Results presented emphasized the major advances achieved in lactation biology research that can be used to enhance lactation performance in farm animals and also identified numerous areas of lactation biology in farm animals that need further attention.

Lastly, we took this opportunity to present the H. Allen Tucker Lactation and Endocrinology Award, sponsored by the H. Allen Tucker Appreciation Club, to Drs. Geoffrey E. Dahl and Rupert M. Bruckmaier.

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